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PAPERS

IN

AGRICULTURE.

AGRICULTURE.

IN the preceding Volumes of the Society's Tranſactions, mention has been made of the large Plantation formed by Thomas White, of Retford, Nottinghamſhire, Eſq; at Butsfield, in the Pariſh of Lancheſter and Biſhoprick of Durham, and accounts given of the ſeveral Medals adjudged to Mr White, for the different kinds of trees planted on that Eſtate: This Year, the Society having received Certificates properly authenticated, by which it appeared, that there had been planted at Butsfield, between the third of February, and the

eighth

eighth of April, 1784, thirty-one acres, four perches of land, with thirty-ſeven thouſand two hundred and thirty Alders, from two years old to four; tranſplanted in order to raiſe Timber, which are well fenced round with a good ſtone wall, five feet three inches high, and the trees ſhooting with great vigour. The Gold Medal being the premium offered for planting Alder, was adjudged to Mr. White; from whom alſo the following account of that Plantation, has been re-received, for which the thanks of the Society were given him.

MR. WHITE'S ACCOUNT
OF HIS
PLANTATION,
AT
BUTSFIELD, IN DURHAM.

RECEIVED, FEB. 2, 1786.

SIR,

AS I have been ſo happy as to receive many honorary rewards from the Society, for the Encouragement of Arts, Manufactures and Commerce; for planting many different kinds of trees upon my infant eſtate at Butsfield plantations, in the county of Durham: A ſenſe of

Gratitude for ſuch liberal and diſtinguiſhed marks, of the Society's favour and attention, paid to my feeble endeavours to proſecute ſo uſeful a work, has encouraged me to trouble you with this letter; begging the favour of you, to lay it before the Society, at your leiſure.

The promoting of uſeful knowledge, being their ultimate wiſh, I ſhall be particularly happy, if my letter may in the ſmalleſt degree be acceptable to them, by conveying an account of the progreſs and ſucceſs of my plantations.

As I had long entertained a favourable idea, founded upon obſervation and experience, of the great profits, as well as national utility of planting; and being determined to go upon a large ſcale, both for the important article of ſhelter, as well as for the great ſaving in point of fencing; my plan, being to plant a thouſand acres, I ſpent ſome time, in looking out for a proper ſubject; the great objects of my reſearches were, firſt, to find a good internal market for the ſale of my wood, and if it ſo happened, an opportunity of exporting it to diſtant markets; ſecondly, to find in ſuch a neighbourhood an eaſy purchaſe of a large tract of freehold land, of ſuch a quality as rendered it of little value for producing corn or graſs, and at the ſame time not unfavourable for the growth of wood, and containing good reſources for making proper fences, and erecting buildings, &c. for protecting it. I was at length happy enough to find a ſubject that promiſed all thoſe advantages, the quantity of acres excepted, which I could not meet with upon ſo large a ſcale as I wiſhed; my firſt purchaſe being no more than two hundred and twenty ſeven acres: but as it lay in the internal part of a large common of ſeventeen thouſand acres, which was then dividing by Commiſſioners, under an Act of Incloſure; and as that part of the common, from its quality and ſituation, was not likely to become an intereſting object to the circumjacent proprietors, who bordered upon this large tract; and whoſe property in general lay at a diſtance from it, I had good reaſon to believe, that I could accompliſh my plan, by purchaſing near at hand what I had occaſion for at an eaſy rate; and I had ſome time afterwards an opportunity of buying three hundred acres more within the ſhelter of my firſt purchaſe; both which lay within the vicinity of the great national coal works, of which New Caſtle is the port for exportation: and alſo within a marketable diſtance of a large tract of country; through which runs the river Weare, abounding with lead mines, which together with the collieries create an immenſe conſumption of wood, particularly ſmall wood, the growth of a few years; there is likewiſe a conſiderable demand for wood for many other purpoſes, eſpecially for charcoal.

Many of the natural woodlands, in the county of Durham, were almoſt exterminated, owing to the indiſcriminate mode of cutting them, and the ſhameful neglect of the fences, which expoſed them to the conſtant ravages of cattle, making Wood a very ſcarce and dear article in the country: with theſe advantages before me, happy in the proſpect of benefitting my family, and ſerving my country, in a way ſo agreeable to myſelf; about ten years ago I began to incloſe my firſt purchaſe with a ſtone wall near ſix feet high, which was accompliſhed the ſame year; I alſo built ſeveral cottages, for the protection of my plantation, as well as for the reception of my work people.

The ground of this plot, whilſt in a ſtate of nature, was covered over with ling, fern, broom and bad graſs, and ruſhes in the wet places; the high parts of it very bad land, of a channelly quality, and not many inches from a grit ſtone rock: lower down the hills, the land is of a better quality, affording a tolerable depth of ſoil, but was then very cold and ſwampy for want of draining. The features of this incloſure are rather gentle than bold, inclining from the north and ſouth, down to a narrow valley in the middle, which continues from eaſt to weſt, through the adjacent country; over which a ſmall but petulant trout ſtream, wantonly meandered in ſo many ridiculous mazes, as choaked its own progreſs, and rendered the whole of this ſmall valley, containing about eleven acres, of my beſt and moſt ſheltered land, almoſt uſeleſs.

My next attention was applied to the conducting it through the ground in an eaſy curving line, filling up the many circumvolutions it had made in its former paſſage; after which, as ſeveral ſprings were contained within it, I laid ſtone conduits to conduct them off to the new water courſe; theſe were made nine inches deep within, ſix inches wide, and laid one foot below the ſurface, that the trees which are planted upon them, might have room to vegetate.

I next proceeded to the paring and burning its rough and wild ſurface of ruſhes, &c. and to the levelling a great number of hillocks that had been thrown up by the water at the time of floods; after which, I trenched up the whole to the depth of eighteen inches, keeping the aſhes raiſed by burning to the depth of about ſix inches from the ſurface, that they might the better promote the vegetation of the young plants; and having reſerved about three acres for a nurſery, which was ſtocked with a large quantity of young ſeedling trees, purchaſed for the purpoſe; I planted the remainder, with the common baſket Ozier, and other aquaticks: the expenſe of the whole of this improvement, was conſiderable; but ſo much land may be truly ſaid to have been made for ever, out of a maſs of rudeneſs, which yielded no profit to its Owner. The new Water-courſe formed an excellent conductor not only to the ſtone drainage made in the valley itſelf, but alſo much aided my ſubſequent operations in the draining the ſides of the hills, from which large currents of water were collected, and brought into the new cut, ſo that it has ſince anſwered in a double capacity.

In carefully examining the boggy parts of the riſing grounds, I found the land of two different qualities, which appeared to be ſwampy from different cauſes: The firſt part which fell within my obſervation, and which contained the greateſt quantity of land, was a light hazel earth, mixed with ſtones, had an open grit ſtone rock at the bottom, which lay at unequal depths from the ſurface; out of which iſſued out many very ſtrong ſprings, ſome of them making a very ſingular appearance above ground, from a kind of ſcum or moſs that annually vegetated on the ſurface of the water; and which in the courſe of time, in ſome degree, dammed up the current, and as it accumulated into a maſs, carried up the water along with it, which conſtantly kept diſcharging itſelf out of the ſides of theſe ſpungy quaking hillocks; many of which had ariſen to a conſiderable height, and had often proved the graves of animals, as appeared from the many bones that were dug up, whilſt my people were cutting the drains. It was therefore evident that the bad condition of this part of the ground, was cauſed by ſprings only; theſe were eaſily taken off by digging at their head or ſource, down to that level where the water boiled up and formed one collected ſtream; from which my cuts were made, ſufficient to contain a ſtone conduit, fifteen inches deep, and ſix inches wide, allowing the top of them to be one foot below the ſurface of the ground: all thoſe conduits were directed down the ſides of the riſing grounds, in a direction north and ſouth, to the new water-courſe, in the valley below.

The other kind of boggy land, the quality of which engaged my attention, appeared plainly to proceed from the toughneſs and tenacity of the ground, being a ſtrong ſoil at the top, with a cold clay bottom; under which lay a cloſe bedded rock, whoſe interſtices were alſo fill d with clay; this kind of land ſeldom contains any ſprings, and none were found therein; it therefore became wet from the rain water not being able to find its way through it. This turned out a much more difficult ſubject to improve, than the looſe ſpringy ground above deſcribed, as covered drains made with ſtones would have no effect; the only alternative left me, was to make a number of ſmall open drains, about two feet deep, one foot wide in the bottom, and two at the top, and to carry the ſame longitudinally along the ridges of the riſing grounds; the better to intercept the water in its paſſage downwards, and which I afterwards conducted to the new water-courſe, by ſome few general drains cut at right angles to the former ones.

Having compleated the incloſing and draining my ground, my next buſineſs was the paring and burning about eighty acres more of the deepeſt land, and after the aſhes were ſpread over the ſurface of it, I trenched the greateſt part of it with the ſpade to the depth of fifteen or eighteen inches, the reſt was ploughed very deep; the latter I found the cheapeſt method, and nearly as efficacious as the former. I then began to plant, making choice of the autumn, for the high and barren parts; and the ſpring for the lower and deeper land: On the former ſubject, I chiefly confined myſelf to the planting the hardy natives of mountainous countries; ſuch as the Larch, Pine, and Fir kind, Birch, Geen-tree, and Mountain Aſh, with ſome others; all which for the ſake of ſhelter, I planted at two feet aſunder.

Upon the lower and more fertile ground, part of which was prepared as above deſcribed, I planted trees of a more permanent growth, moſt of which would produce a new ſucceſſion from the root after cutting; ſuch as the Oak, Aſh, Elm, Sycamore, Beech, and weſtern Plane; and in the moiſt ground, the Alder, Poplar, and Norfolk-Willow. Theſe trees were planted at proper diſtances, to make a timber wood; and in the intermediate ſpaces, by way of ſhelter as well as profit, all the mountain kinds as above-mentioned, were introduced; moſt of which except the Larch and Geen tree, are intended to be weeded out, after they arrive at a ſaleable age, to make room for the timber-trees: In this part of the ground, the trees were planted at a yard diſtance.

It is well known that the reſinous kinds, ſuch as Larch, Pine, and Fir, are more rapid in their growth, will grow upon worſe land, come to profit ſooner, and afford more ſhelter than the generality of other trees; but it ſhould be always conſidered, that they never ſpring again after cutting; ſo that in the courſe of a few years they arrive at maturity, muſt be cut down and you have the melancholy proſpect of being again preſented with a dreary waſte.

As I propoſe thoſe kinds, the Larch excepted, to remain for timber only, in the higheſt and moſt barren parts of my Plantations, that it may never come under ſo unpleaſant a deſcription, I have there at proper diſtances, attentively planted amongſt them ſome hardy kinds, which propagate themſelves ſpontaneouſly from ſeed; ſuch as the Birch, Mountain Aſh, and Geen tree, &c. the ſeeds of which will be copiouſly ſown, and planted, by the winds and birds, which nurtured by the foſtering ſhade and warmth of the timber trees, will propagate themſelves in every vacancy of the Plantation; and thereby repleniſh the naked ground when the reſinous kinds are cut down and removed.

As I have long found from obſervation, that in unſheltered ſituations thoſe trees thrive beſt, that are not above one foot, or eighteen inches high when planted; as they furniſh a ſhorter lever than taller trees, which by their own force operating with the power of the winds, are conſtantly diſtreſſing the root, by breaking the young fibres, which deſtroys the progreſs of vegetation. To remedy which, it is common for inexperienced planters to place them ſo low in the earth, as to be in a great meaſure out of the reach of the ſolar influence; a practice equally hurtful to vegetation as well as contrary to the mode in which nature plants her own productions: I therefore always pay more regard to the ſtrength of the ſtem and fibrous ſtate of the roots, than to the height or age of my trees, which were always planted very ſmall, having few luxuriant weeds, or long graſs to ſtifle or pull them down.

I choſe alſo to intermix the different trees in my Plantations, as much as poſſible; not only by way of eſtabliſhing a ſucceſſion in the manner bebefore related; but alſo from an opinion, that ground ſo planted will produce more uſeful wood, and that the earth itſelf furniſhes an heterogeneous maſs of matter, containing the proper food, for different plants

lants to vegetate upon ; and that every diſtinct ſpecies draws a peculiar kind of nouriſhment different from the reſt ; which is neceſſary for its own ſupport.

If this opinion is well founded, a promiſcuous arrangement of various kinds of trees, muſt be the beſt mode of diſpoſing them; as each kind, will with the more facility, ſearch out and obtain its ſhare of proper nouriſhment, without robbing its neighbours ; which being plants of a different genus, will partake of that aliment, which is allotted for their ſuccour: On the other hand, if trees of the ſame kind, and which draw from the earth the ſame ſpecifick nouriſhment, are planted very near each other upon the ſame common bed, they muſt ſoon exhauſt the foil of that nutriment, peculiar to their nature, and muſt dwindle of courſe.

I remember an experiment tried ſome years ago, by Mr. Jones, gardener to the Earl of Darlington, at Raby Caſtle, which I think throws ſome light upon this ſubject: He ſowed Peas, which is ſuppoſed to be rather a meliorating than an impoveriſhing crop, for ten years together, upon a piece of rich land; the reſult of this experiment was, that for the firſt two years the crop was abundant; but after that time, it gradually became more and more puny and meagre, ſo much ſo, that on the tenth year of ſowing, the earth was ſo drained of the proper nutriment this plant required, that the Peas would not even vegetate within it, but lay till they became putrid; after which, without any previous manuring, he planted ſtrawberrys upon the ſame ground, which produced an excellent crop.

Some ſpecies of trees draw their nouriſhment very near the ſurface of the earth, and often form a compact web of roots above ground; others occupy the middle ſtratum, and ſome there are ſo hardy as to force their way, not only through the ſtubborn ſoil itſelf, but through ſtones, rocks, and minerals of all kinds, to the depth of twenty or thirty feet or more; which, without paying any reſpect to beauty, ſhews the utility of interſperſing plantations with a variety of different trees, that each may have ſpace not only to find its proper pabulum, but to extend itſelf to that level it moſt delights in; and the whole body of ſoil and underſtratum, in this caſe, inſtead of being partially occupied, will probably furniſh nutrition, and become one interwoven maſs of roots and fibres, as far below the ſurface of the earth as the trees are elevated above it.

Having, in the courſe of about four years, compleated all the abovementioned Works, I began to incloſe my ſecond purchaſe of three hundred acres, with a ſtone wall of the ſame dimenſions as the former. I alſo added many convenient buildings to a farm-houſe, which I found upon the ſpot; erecting ſeveral more cottages, both for the protection of my new plot, as well as to increaſe the number of my labouring people. After this, I proceeded to lay out, about my houſe, a ſmall, but neat farm; which in a few years will be ſecurely defended from the formidable winds of a naked country, by ſurrounding Plantations of conſiderable extent.

This farm, as it may be conſidered the eye of my property, was intended to afford an additional ſecurity to my woodlands; alſo that I might have a future opportunity of keeping ſome horſes, to carry my wood to the neighbouring collieries, lead mines, &c. as well as to furniſh the little colony of cottagers, I have planted and intend to plant upon my new ſettlement, with Cow-paſtures, Potatoe-garths, Gardens, Orchards, &c. and alſo for the facility and pleaſure of ſeeing and killing the game that are ſuccoured in the adjacent Plantations, and for defending them from neighbouring depredations.

This ſmall farm, I ſubdivided into little fields, with Quick-hedges, and trees planted within them; alſo with belts of wood for internal ſhelter. I next gave it a thorough draining, with ſuch ſtone-drains as were made uſe of in the former plot; I then gave the whole a ſubſtantial, though rather expenſive cultivation: This ground being nearly ſimilar in quality to the firſt plot, with this difference only, that the declivities were fewer and rather more gentle, and the aſpects not quite the ſame. I ſhall therefore not trouble you with the conſequent alterations made in the mode of planting it, as they differed very immaterially from what I have before deſcribed.

Finding the Orchards, in the county of Durham, had been as much neglected as the Woodlands, and that there were but few Apples to be purchaſed in that populous neighbourhood, except thoſe that were imported at Newcaſtle, and other ſea ports; I thought it adviſable to mark out ſome ground, for the purpoſe of planting Apple and Pear-trees. I accordingly made choice of eleven acres, for that purpoſe, which have been ſince planted with all the beſt, and moſt hardy kinds of winter and ſummer fruit, in a favoured ſituation, laying to the ſouth, and emboſomed by a large tract of new planted wood. I alſo made choice of and planted ſome ſimilar ſituations, upon a ſmaller ſcale, amounting in the whole, to about fourteen or fifteen acres; which compleated the improvements I had planned out for my ſecond purchaſe, all which were performed in about four more years: the laſt two have been induſtriouſly occupied in repleniſhing my nurſery for the extention of my intended plan of operations, and in renewing with living trees, the vacancies where the firſt planted ones had died, which were very numerous, from the loſſes occaſioned by a ſeries of bad ſeaſons.

Great attention has alſo been paid to the eradicating ſuch as did not appear to thrive on particular parts of the ground; and to the replacing them with ſuch kinds as promiſed more ſucceſs:

this buſineſs has been attended to with ſuch a vigilant eye by my fac-totum, at that place, that I believe out of five hundred and twenty-ſeven acres, my ſmall farm included, there is not a yard ſquare of my whole ground but what is occupied by ſome uſeful or ornamental plant; there having been planted and replanted above four million of Trees, amongſt which, beſides the profitable kinds that have been before mentioned: I hope my poſterity will pardon (as an involuntary error in an admirer and ſtudent of nature) the foible of encumbering the ground with many thouſand ſhrubs and plants, which can only furniſh beauty to the eye of taſte, and food to the feathered generation.

I have conſtantly paid an annual viſit to my improvements in the county of Durham, ever ſince they began, until the laſt two years, I was prevented by the purſuit of my profeſſional engagements. The laſt Autumn, however, I had an opportunity of ſeeing them, on my road to Scotland. The trees in the firſt Plot, being well rooted in the earth, had made very rapid ſhoots. I muſt acknowledge it gave me much pleaſure to ſee ſo large a ſurface of wood elevated ſome feet higher, ſince my laſt viſit; and I rejoiced to ſee the ſombre unprofitable heath for ever baniſhed, by a gay ſucceſſion of thriving trees, in their autumnal liveries, now ſufficiently high to ſhelter the Planter from inclement winds, and riſing very faſt into property and perfection. My Plantations already begin to be an aſylum for the game; the Pheaſants, Hares, &c. from diſtant woods, have diſcovered a new retreat.

The trees in general flouriſh very well in both plots, particularly the Larch, Birch, Geen-tree, Scotch-fir, and Mountain Aſh; amongſt which, the former diſtinguiſhes itſelf very much, being in all places conſiderably larger, and in ſome near twice the ſize of any other kind; and it appears alſo to afford a very ſalutary ſhade and ſhelter, to thoſe trees that partake of its influence: this convinces me of a great error I have committed, in planting Scotch-firs, by way of nurſes, which do not appear to anſwer the intended purpoſe of advancing the growth of the other trees; on the contrary, I find them great tyrants amongſt their neighbours, from the ſtrength and great extent of their branches; alſo from the cloſe covert of the leaves, which not only exclude the air, but prevent a due admiſſion of the rains.

The Larch is not only ſuperior in beauty and hardineſs, but furniſhes more durable and valuable timber; and is likewiſe a more tender and friendly nurſe to more delicate trees, being furniſhed with a great number of ſmall pliant branches well garniſhed with leaves; and which from their flexible quality, will yield and give place to the adjacent trees, and are not ſubject to laſh and buffet them; they alſo more readily admit the rains, than the Scotch-fir, and are not liable to receive injury in ſnowy ſeaſons, when the branches of the latter are frequently mutilated, and the trees ſometimes totally deſtroyed: the effects of which, I have too fatally experienced.

I think it is probable other planters may have been often miſlead by a miſtaken idea of the ſuperior hardineſs and nurturing quality of the Fir; or from not being acquainted with any other more proper tree to ſubſtitute in its place, have adopted it; or I ſhould conceive, they would not have planted ſuch numbers of this truly gloomy and unpleaſant plant: In reſpect to ſhelter, it muſt be allowed to contribute in the winter more than moſt others, particularly the deciduous kinds; but as far as relates to the propagation of the Plantations themſelves, I am of opinion that internal ſhelter at this dreary ſeaſon, when the powers of vegetation are totally locked up, is of much leſs conſequence, than in the more genial months, when the trees are making their ſhoots; the internal warmth of a Plantation muſt then greatly facilitate the operations of nature, and the Larch, being one of the moſt early trees we have in the ſpring, is at that time in full foliage; and I conſider it the moſt promiſing tree I have met with to aid her in that neceſſary work; and as I find it not eaſy to ſeperate pecuniary gratifications from thoſe of taſte, notwithſtanding my general diſlike to the Scotch Firs; I am not ſo much their enemy, as totally to exclude them from my Plantations, as the ſable hue produced by their foliage, has a good effect when properly interſperſed and blended with the more vivid tints of other more pleaſing and lively trees: I ſhall, beſides thoſe that are intended to remain for timber on the barren parts, leave a number of them upon my beſt ground, for the purpoſe of decoration; the remainder I am now exterminating with all poſſible vigour.

The Larch, I have found by experience, will thrive where few other plants will live: The Birch, though no timber-tree, is a uſeful wood, affords great ſhelter, and is almoſt as hardy as the Larch, as I have fully proved at Butsfield Plantations, which in its uncultivated ſtate had ſeveral roads over it, ſome of which that lead down the declivities of the hills, had all the ſoil waſhed from them, by the torrents, nearly to the rock; thoſe roads were planted with ſmall trees of different kinds, making uſe of a pick-axe to form the holes for their reception: I alſo planted up all the old quarries, where ſtone had been got, in the ſame way: there being no ſoil, I brought a ſmall portion of earth to each plant, and upon thoſe unfavorable ſpots, where moſt of the other trees had died, theſe plants appear to flouriſh as well as upon a better ſubject.

When I conſider the many virtues of that invaluable and pleaſing tree the Larch, I think it a great misfortune that its introduction into this country, was not of an earlier date: About fifty years ago I am told this Alpine plant, was treated as a tender exotick, and planted out, with the utmoſt care and diligence, in our hot beds and hot houſes; I am every day more convinced of its utility, both from domeſtic and foreign intelligence.

I muſt obſerve, that though there was not a ſingle tree or buſh upon, either of my purchaſes, before I began the improvements, a circumſtance ſoon after happened, which convinced me that wood had grown upon the land; for in digging my drains, the roots of large trees were found, alſo upon the ſurface of the ground, ſeveral very large heaps, containing the cinders of iron ore, which metal this country ſtill produces, (and it is probable the ſmelting it, may in barbarous times have been the original cauſe, of the preſent ſcarcity of wood in ſome of the northern Counties; as there is a tradition prevails amongſt the country people, that the whole of thoſe waſte lands, was once a great foreſt; which was all conſumed in ſmelting the ore, by a kind of foot blaſt, before the invention of better engines; and that the workmen frequently ſhifted their ground as the wood or ore decreaſed, till they had overrun the whole country.

I am making ſome experiments on the texture of the Larch-timber, that I may aſcertain its quality for different untried purpoſes; the reſult of which I ſhall be happy to lay before the Society, at ſome future opportunity; and if I can in any reſpect further their general plan, by a fuller and better explanation; ſo as to throw more light upon this uſeful ſcience, which I humbly conceive has not yet been explored to its fulleſt latitude in this country. I ſhall think myſelf highly gratified not only in promoting a work which has ſo warmly and unremittingly excited my ardour, and attention for many years, but ſhall alſo think myſelf much flattered in having the honour to correſpond with a Society of Gentlemen of ſuch diſtinguiſhed liberality and ingenuity.

I am Sir,

Your moſt obedient

humble ſervant,

Mr MORE,

THOMAS WHITE.

Retford, Notts.
Jan. 31, 1786.

The following Experiments and Obſervations on the Culture of Turneps, were communicated to the Society, by GEORGE WINTER, *of* Charlton, *near* Briſtol, Eſq. *and Thanks were returned to him for the ſame. The Drawing or Model of the Drill, mentioned in* Mr WINTER's *ſecond Letter, has not yet been received, a particular Deſcription of it muſt therefore be deferred till the Publication of ſome future Volume of theſe Tranſactions.*

SIR,

THE very numerous experiments I have repeatedly made, more particularly this ſummer, on Turnep Seed, to prevent being deſtroyed by the Fly, enables me to ſend you my firſt account, and recipe, for the moſt effectual preſervation of that excellent Vegetable.

My Turneps have already been inſpected by many Gentlemen in this neighbourhood: Should a member of your Society live near this place, he may examine my numerous experiments, which, if your Society will deem worthy their peruſal, will ſend you an account of the whole, with the particulars of my obſervations on each.

As I have been credibly informed, that Turneps have this ſeaſon been ſowed three times on the ſame ground, as the ſeaſon is ſo far advanced, I think no time ſhould be loſt in ſerving the community.

Your anſwer by return of poſt, will be eſteemed a favor conferred on

Sir;

Your moſt obedient humble ſervant,

Mr MORE. GEORGE WINTER.

Charlton, near *Briſtol*,
July 7, 1786.

P. S. Steep Turnep Seed, twenty-four hours or more, in ſufficient quantity of Train Oil. Take a fine ſieve, or linen bag, drain the oil from the ſeed, which mix with a quantity of good earth finely ſifted, immediately drill or ſow. When the plants begin to appear on the ſurface, let the ground be ſowed with ſoot, from eight to ſixteen buſhels per acre.

N. B. Linſeed, or other good vegetable oil, is equally as efficacious, and by draining the oil, a ſmall quantity will be effectual for a large quantity of ſeed—the remainder will ſerve for common uſe, ſuch as for harneſs, &c.

This mode is equally beneficial for every kind of grain, or ſeed ſown in the garden. Time will not permit me at preſent to ſtate my philoſophical reaſons on the ſubject.

Upwards of one hundred Gentlemen and Farmers have examined my crops of Grain and Carrots planted by my Machine, which crops are allowed to be far ſuperior to any in this country.

The ſuperior advantages of drilling, are great and many. When the ſeed is depoſited at an inch and a half, or not exceeding two inches deep, it immediately attracts moiſture from the under ſtrata. A proper Machine with a Harrow fixed to it, will ſufficiently cover the ſeed, requires no further harrowing, rolling, nor buſhing. By this mode, the ſoil will be ſo looſe and porous, as readily to admit the dews and influence of the Atmoſphere, by which the tender roots and fibres will freely extend themſelves for nouriſhment. By the common mode of raiſing Turneps, the ſeed is ſowed broad caſt, the ſcorching ſun often injures it before it can be covered; the treading of the horſes by harrowing, buſhing, and rolling, ſo hardens a loamy or ſtiff ſoil, as entirely to exclude the air, dews, &c. and prevent the ſeed from vegetating.— Such are the effects of common Agriculture, not only on Turneps, but every other kind of ſeed, and all ſorts of grain; near half is buried and deſtroyed by the preſſure of the horſes feet, improper dragging, rolling, &c. which I am ſurprized has never hitherto been noticed by any agriculturiſt. Repeated obſervations and experiments have fully convinced me of ſuch a mode being extremely erroneous. At preſent, can only obſerve, that if the Society will eſteem my obſervations and experiments thereon worthy their attention, will with much pleaſure convey them, as time may permit.

Can a perſon at this diſtance be elected a Member of your Society, without perſonal attendance? will you be ſo obliging as to favor me with the conditions, and terms of admiſſion.

SIR,

PERMIT me to acknowledge the receipt of your favour, and to inform you, that Gentlemen who have ſeen Mr. Cooke's and my Machines, aſſure me that mine is far ſuperior to his or any other yet invented—It is ſo ſtrong, that nothing but the greateſt violence can poſſibly injure it—It has been tried on the ſtiffeſt ground, with open Drains fifteen inches wide, and twenty inches deep, which muſt have broke to pieces any inſtrument of leſs ſtrength than mine, and executed extremely well, without receiving the leaſt hurt—Mine has nothing complex in its conſtruction, is governed by one movement only, and in a few minutes is fully underſtood by any perſon of the meaneſt capacity—By an exceſſive cloſe attention to its executive powers, have lately made more improvements, and am now fully convinced that it is complete.

Will furniſh you with a Model or Drawing as ſoon as poſſible, and I will not heſitate to ſay, that the Drill huſbandry muſt, in a very ſhort time become general, on land where *large ſtones* cannot obſtruct.

I beg leave to preſent you with the particulars of my experiments on Turneps, which I wiſh may be acceptable to the Society.

And am Sir,
Your moſt obedient
humble Servant,

Charlton, Oct. 11,
1786.

GEORGE WINTER,

Experiments on early Dutch Turnep-ſeed, ſowed on beds in my kitchen garden, in Drills twelve inches diſtant, one inch and a half deep, on the 11th of *May*, 1786. Theſe beds had been manured with rotten dung, in 1785—After planted with Cabbages.

Remarks made the 26th of *June.*

Stake

No. 1 Seed without any preparation—No. 4, or 4th beſt.

2 Ditto mixed with ſoot, 3d.

3 with barton draining, 4th.

4 out of dunghill, 2nd.

5 Stale human urine, very few plants appeared

6 Lime and barton draining, none vegetate

7 Soot and water, 2nd.

8 Soot and barton draining, 2nd.

9 Elder leaf juice, 3d.

Stake

No.10 Seed mixed with elder and barton draining, 2nd.

11 Ditto and ſoot ſowed over the covered drills, 3rd.

12 Ditto and lime ſowed over ditto, 3d.

13 Ditto mixed with ſlacked lime, very few plants appeared.

14 Seed ſowed, ſcattered ſoot over, then covered, 3d.

15 Ditto ditto ſlacked lime over ditto, very few plants appeared.

16 Elder Buſh drawn over when the plants appeared, 4th.

17 Seed ſteeped in train oil, flouriſhed extremely, 1ſt.

18 Ditto in linſeed oil, rather inferior.

The Linſeed Oil was taken out of a bottle that had contained oil of Turpentine for painters uſe.

N. B. All the ſeeds were ſteeped ſix hours in the different compoſitions.

EXPERIMENTS on Turneps (Green Norfolk) drilled one inch and a half deep, at one foot diſtance in the rows, on beds eight feet three inches long, and two feet wide—Weight of ſeed, half a drachm to each bed, mixed and ſteeped with ſundry articles as under, to endeavour to aſcertain the moſt effectual remedy for preventing the Fly: Drilled on unmanured ground, the 20th of June, 1786. Marked with Stakes.

No. 1 Seed mixed with half an ounce of dry ſoot, then mixed with apint of ſifted mould, and drilled.
2 Soaper's aſhes, ditto.
3 Wood aſhes, ditto.
4 Pounded gunpowder.
5 Brimſtone.
6 Slacked lime.
7 Seed ſteeped ſix hours in ſoot, and a quarter of an ounce of train oil, mixed with a pint of ſifted mould.

Stake
No. 8 Seed ſteeped in Soaper's aſhes, and ditto.
9 Wood aſhes.
10 Gunpowder pounded.
11 Brimſtone.
12 Slacked lime.

13 Seed ſteeped ſix hours in ſoot, and a quarter of an ounce of linſeed oil, mixed with a pint of ſifted mould.
14 Soaper's aſhes, and ditto.
15 Wood aſhes.
16 Gunpowder pounded.
17 Brimſtone.
18 Slacked lime.

19 Seed mixed with brimſtone, and ſalt petre pounded, mixed with a pint of ſifted mould.
20 Seed ſteeped ſix hours with ditto, and a quarter of an ounce of linſeed oil, ditto.

21 Stake

Stake

No.21 Seed ſteeped ſix hours with ditto, ditto train oil ditto.

22 Seed ſteeped ſix hours with brimſtone, and barton draining, mixed with mould.

23 Ditto with linſeed oil.
24 Ditto with train oil.

25 Seed Drilled in, and covered, after ſowed ſoot over the beds.
26 Soaper's aſhes.
27 Wood aſhes.
28 Slacked lime.

29 Seed ſteeped ſix hours in linſeed oil, mixed with mould, and covered, then ſowed ſoot over the beds.
30 Ditto in train oil, ditto, ditto.

July 17, 1786. Particularly examined all the Beds.—None had entirely eſcaped the Fly—The leaſt injury was done to No. 30, 29, 24, and 23, which grew ſo luxuriant, as to produce rough leaves ſeveral days prior to the moſt flouriſhing of any other number, and enabled them the ſooner and better to withſtand the Fly's attack.—The linſeed oil, was the ſame as that uſed in the firſt experiment—Its effects were inferior to train oil, which I muſt impute to the drying properties of the Turpentine.—The leaves of the ſeeds ſteeped in oil, were of a much darker green, and appeared twice as thick in bulk and luxuriancy, and the plants were a conſiderable deal larger, than any of the other numbers—In point of luxuriancy, &c. they ſtand as under.

No. 30, 29: 1ſt beſt. Longeſt before, and leaſt touched with the Fly, which,

which in ſome degree impute to the ſoot's being ſcattered over the beds.

24, 23—2nd beſt.

3, 5, 11, 17, 22, 25, 26, 27, 4th beſt.

7, 13, 19, 5th beſt.

All the others far inferior to even No. 5.

Other experiments tried ſince, in July and Auguſt, which cannot at preſent inſert.

The Thanks of the Society, were returned to THOMAS BOOTHBY PARKYNS, Eſq; *for the following Letter on the Culture and Uſes of the Plant called* Racine de Diſette, *and to* Sir RICHARD JEBB, Bart. *for his Care in tranſmitting to the Society, the Seeds mentioned therein. Theſe Seeds were diſtributed to ſeveral of the Members of the Society; the Plants produced from them flouriſhed well, and are evidently a kind of Beet; but being ſown at too late a Seaſon, did not arrive at that Magnitude which might have been expected from the Account given of them. Further Experiments are however now making, the Reſult of which, will furniſh an Article in ſome future Volume of theſe Tranſactions.*

SIR,

I HAVE this inſtant received Sir RICHARD JEBB's letter concerning the Racine de Diſette, and ſend in conſequence a parcel of the Seed, which the Society will honor me by accepting.—I am obliged to ſend it to the Warehouſe immediately, as the Diligence by which it is to go, ſets off to Paris in a few hours—I have therefore no time to tranſlate, or tranſcribe the full directions given by the perſon who introduced it firſt into this country, for the cultivation of the Racine de Diſette; nor to deſcribe its various and profitable uſes. I ſhall content myſelf, as no time ought to be loſt, and that I may not let this opportunity ſlip, being now full late to ſow the ſeed, to ſay that the ſeed ſhould be ſown in the garden, or very good ground, in rows, or broad-caſt, and as ſoon as the plants are of the ſize of a gooſe-quill, to be tranſplanted in rows of eighteen inches diſtance, and eighteen inches a part, one plant from the other: care muſt be taken in the ſowing, to ſow very thin, and to cover the ſeed, which lays in the ground about a month, an inch only.—In tranſplanting, the root is not to be ſhortened, but the leaves cut at the top; the plant is then to be planted with a ſetting-ſtick, ſo that the upper part of the root ſhall appear about half an inch out of the ground; this laſt precaution is very neceſſary to be attended to. Theſe plants will ſtrike root in twenty-four hours, and a man a little accuſtomed to planting, will plant with eaſe, one thouſand eight hundred, or two thouſand a day. In the ſeed-bed, the plants, like all others, muſt be kept clear of weeds: when they are planted out, after once hoeing, they will take care of themſelves, and ſuffocate every kind of weed near them.

The beſt time to ſow the ſeed is from the beginning of March, to the middle of April; the cultivator however adviſes to continue ſowing every month until the beginning of July, to have a ſucceſſion of plants. The ſeed will get to England ſix weeks or two months too late; of courſe, the leaves will not produce ſo much green forage, nor will the roots be ſo large by five or ſix pounds weight as if they had been ſown at the proper ſeaſon.

I ſhall only add for the preſent, that both leaves and roots, are moſt excellent both for man and beaſt. This plant is not liable, like the Turnep, to be deſtroyed by inſects, for no inſect touches it, nor is it affected by exceſſive drought, or the changes of ſeaſons. Horned cattle, horſes, pigs, and poultry, are exceedinly fond of it, when cut ſmall. The leaves may be gathered every twelve or fifteen Days; they are from thirty to forty inches long, by twenty-two to twenty-five inches broad. This exfoliation, which is properly explained by the cultivator, aſſiſts the encreaſe of the root inſtead of deſtroying it, as it does that of the Beet-root, which it reſembles very much, both in the ſeed and leaves. This plant is excellent for milch cows, when given to them in proper proportions, as it adds much to the quality as well as quantity of their milk; but care muſt be taken to proportion the leaves with other green food, otherwiſe it would abate the milk, and fatten them too much, it is of ſo exceeding a fattening quality.

I have taken ſteps for my receiving in England, any quantity of the ſeed I may want, a precaution very neceſſary, becauſe this plant, like the cabbage, muſt be planted in the ſpring, for ſeed; ſo that the plants of this year 1786, will not produce ſeed time enough for the year 1787.

I intend being in England the firſt or ſecond week in Auguſt, and ſhall be happy to communicate the full directions for the cultivation of this excellent plant, that will be full time enough for every purpoſe the Society can wiſh in the further culture of the Racine de Diſette.

I have the honor to be Sir,

Your moſt obedient

humble Servant,

Mr MORE,

T. B. PARKYNS.

Metz. May 13,
1786.

P. S. I intend ſending another parcel of this ſeed the firſt opportunity, for fear this may miſcarry. Sir R. Jebb, will preſent the ſeed to the Society.

An eaſy Method of deſtroying the Red Spider, and other noxious inſects, in Hot-houſes and Pinerys, has long been conſidered as a very deſirable object both to gentlemen and gardeners, and various modes of fumigating ſuch places have been propoſed, and premiums paid by the Society, for that purpoſe; particularly to Mr. Green, of Her Majeſty's Flower Garden at Kew, for his invention of a kind of Bellows, contrived by him, and now much in requeſt, and commonly ſold in the ſhops, by which the fumes of burning Tobacco, put into a cavity made in the nozzle of the Bellows, are blown into the places infected.—The following letter from Mr Ailway, contains a method to obtain the ſame end—but it is hardly neceſſary to add, when the nature and properties of White Sublimate are conſidered,

ſidered, that the waſhing the frames and walls, muſt be done with great care and caution.

SIR,

AS the Society have ſufficiently expreſſed their deſire of finding a method of deſtroying the Red Spider, by having propoſed a premium for that purpoſe, I ſend them an account of an attempt to anſwer that end; made in the hot-houſe of Thomas Clutterbuck, jun. of Watford, Herts, Eſq.

Laſt Summer, this houſe being much infeſted with the Red Spider, I prepared pieces of match, about ſix inches long, the pieces were moiſtened on the outſide with a tincture of Aſſafœtida, in Spirits of Wine, and then rolled in a powder, equal parts of Brimſtone and Scotch Snuff; the gardener was directed to light the pieces, and by means of wires, or other contrivances, place them as near the ground as he could, and behind the frames, &c. at night, and then ſhut up the houſe cloſe. The event was, many were deſtroyed or diſappeared, and very little inconvenience was ſuffered from them, the reſt of the year.

Sometime laſt Winter, I directed the walls of the houſe, frames, &c. to be well waſhed with the following; Take Sublimate four ounces, and diſſolve it in two gallons of water. This hot-houſe was likewiſe greatly infeſted with Ants, not much leſs troubleſome than the Spider; neither Spider nor Ants have been ſeen in this houſe all this Summer; if this method proves effectual, on farther trial, the Society's wiſhes will be gratified I hope to the utmoſt, as the remedy is cheap and eaſily applied.

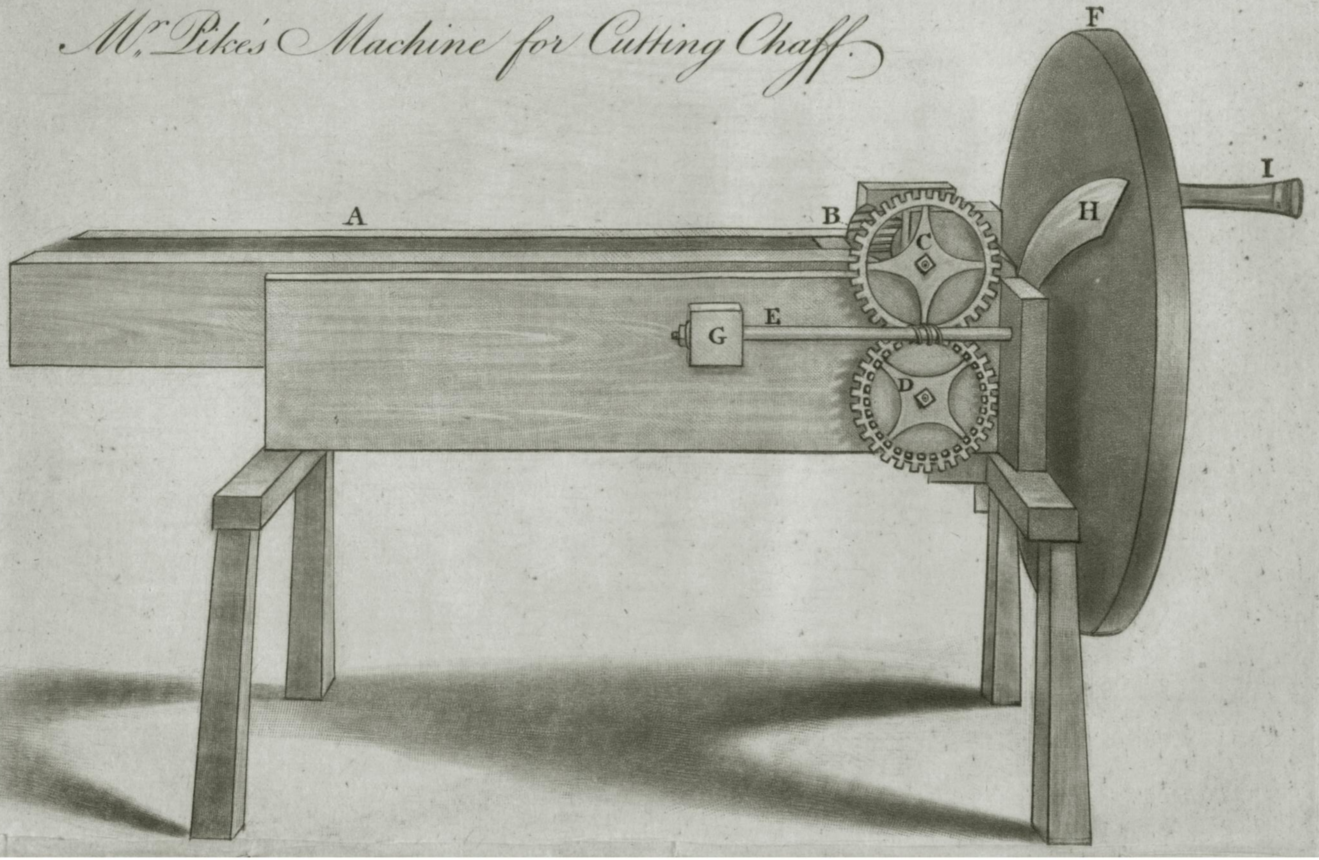
This Waſh may be uſed on old garden walls, and to the roots of trees infeſted with Ants, if made weaker; the experiments I have made, prove that it will deſtroy the tender leaves of ſome plants, though not the roots: One pint and a half, poured four months ago on a ſtandard currant tree, as near the ſtem as I could, has not effected either the leaves or tree itſelf, as far as I can perceive at this time. That this Waſh will be effectual in the deſtruction of all inſects of a tender cuticle, and the ova of moſt others, I am myſelf perfectly convinced, and alſo that it will effectually deſtroy the Spider; I recommend to every gentleman inclined to make the trial, to take care that it be applied with diligence into every crevice of the walls, frames, &c. with a painter's bruſh.

I am Sir,
Your very humble Servant,
MR. MORE. JOHN AILWAY.

The advantages of an eaſy and commodious method of cutting Straw, for the feeding horſes, by ſuch an Engine as could be uſed by common labourers, have been long acknowledged, and ſome bounties have been formerly paid by the Society, for attempts to bring ſuch an Engine to perfection; but the chief objection has hitherto been the great price at which they were neceſſarily ſold.

The following letters, and the annexed plate, with the deſcription of an Engine of a ſimple and cheap conſtruction, invented for this purpoſe, by Mr JAMES PIKE, Watch-maker, of Newton Abbot, in Devonſhire, to whom a bounty of twenty guineas was given, will ſufficiently and readily point out to any workman, the nature and principles of his

Mr. Pike's Machine for Cutting Chaff.



his Machine, one of which is reſerved in the Society's repoſitory, for the inſpection of the publick.

Deſcription of a MACHINE FOR CUTTING CHAFF, *made and invented by* JAMES PIKE, *Watchmaker, of Newton Abbot, Devonſhire.*

THE Engine is fixed on a wood frame, which is ſupported with four legs, and on this frame, is a box for containing the ſtraw, four feet ſix inches long, and about ten inches broad; at one end, is fixed acroſs the box, two rollers inlaid with iron, in a diagonal line about an eighth of an inch above the ſurface; on the ends of theſe rollers are fixed two ſtrong braſs wheels, which takes one into the other. On one of theſe wheels, is a contrect wheel, whoſe teeth take in a worm on a large arbour; on the end of this arbour, is fixed a wooden wheel, two feet five inches diameter, and three inches thick; on the inſide part of this wheel, is fixed a knife, and every revolution of the wheel, the knife paſſes before the end of the box and cuts the chaff, which is brought forward between the rollers, which are about two inches and a half aſunder; the ſtraw is brought on by the worm taking one tooth of the wheel every round of the knife; the ſtraw being ſo hard preſſed between the rollers, the knife cuts off the chaff with ſo great eaſe, that twenty-two buſhels can be cut within the hour.

SIR,

I have invented an Engine for cutting Chaff, on an entire new principle from what was ever, as yet, introduced to the publick, and have accordingly written to ſeveral people to get proper directions to your Society, but could not be informed, until luckily I met with a Mr. Pepperell, of Totneſs, who received a reward from your Society for inventing a Straw or Chip Hat, who gave me the addreſs to you, which induced me to take this liberty.

The Chaff-Cutter is an Engine of old ſtanding; for one ſort, I hear there is a Patent, which I never ſaw—I have ſeen two Engines for the purpoſe, at James Templer, Eſq. at Stover Lodge, in our neighbourhood, made by Mr. Sharp, of London, at twelve guineas each; their complicated conſtruction, the noiſe they made in working, and their high price, gave me a general diſlike to them; and I have, by a ſteady perſeverance, I think brought one to perfection; it does its work more ſpeedily and eaſy, and is not only original, but ſimplicity itſelf: it will cut twenty-two buſhels per hour, and makes no more noiſe than is cauſed by the knife paſſing through the Chaff, and its price will not be one half that of Mr. Templer. This gentleman, the inſtant he ſaw mine, was ſo pleaſed with its conſtruction, that notwithſtanding he had theſe two valuable ones already, ordered one of me.

It has been examined by ſeveral of our moſt reſpectable gentlemen, viz. Sir James Wright, Sir Robert Palk, Sir Thomas Carew, John Cholwich, Eſq. and Colonel Grenfield, of the Horſe-guards in London; who have all expreſſed their opprobation, and ſay it ſurpaſſes all they ever ſaw, both in its ſimplicity and diſpatch of work; the former gentleman ſtrongly perſuades me to have a patent for it, to ſecure the ſale to myſelf, as he does not think it otherwiſe poſſible for me to be paid as I ought; for as ſoon as it appears to the eyes of the workmen, it will be taken from me, and others will reap the advantage of my invention: but as I have a large family, and nothing but my own hands to earn maintenance, cannot think of taking out a patent.

Hope that any informality in the manner I have taken, will be overlooked. I am prompt, to aſk your advice, how I ſhall conduct myſelf ſo as to benefit my family, as well as the Community in general?

neral? An anſwer by the return of poſt, with your advice, whether you think it worth my coming up with it, will be a favour gratefully acknowledged,

By Sir,

Your moſt humble Servant,

JAMES PIKE,

Newton Abbot, Devon.
Jan. 20, 1786.

Deſcrip-

Deſcription of the PLATE of Mr. PIKE's *MACHINE FOR CUTTING CHAFF.*

A. the box, into which the ſtraw is put.

B. The upper roller, with its diagonal projecting ribs of iron, the whole moving by the revolution of the braſs wheel C. on the axis of which it is fixed.

D. a braſs wheel, having upon it a face wheel, whoſe teeth take into the endleſs ſcrew on the arbor E, while the teeth on the edge of this wheel, enter between thoſe on the edge of the wheel C.

On the axis of the wheel D. is a roller with iron ribs ſimilar to B, but hid within the box.

E. The arbor, one of the ends of which being made ſquare and paſſing through a mortiſe in the centre of the wooden wheel F, is faſtened by a ſtrong ſcrew and nut; the other end of this arbor moves round in a hole within the wooden block G.

H. the knife, made faſt by ſcrews to the wooden wheel F, and kept at the diſtance of nearly three quarters of an inch from it by means of a ſtrip of wood of that thickneſs, of the form of the blade, and reaching to within an inch of the edge.

I, the handle mortiſed into the outſide of the wooden wheel F.

Among the Preſents received by the Society, in the Year 1786, were two Machines the one named *The new invented patent univerſal Sowing Machine*, by Mr. John Horn, of Dover, Kent; the other called *A Patent Drill Machine*, invented by the Reverend James Cooke, of Heaton-Norris, near Mancheſter, with which alſo was received a new conſtructed Hand Hoe, invented by the ſame gentleman.

As patents were granted for each of theſe Machines, the Society, conſiſtently with their rules and orders, could take no farther notice of them than to return thanks to the inventors for the preſents; and as full deſcriptions of the Machines have been already ſeveral times printed, the publick are ſufficiently poſſeſſed of the knowledge

knowledge of their different conſtructions.

The Machines at large are reſerved in the Society's repoſitory.

No accounts have hitherto been received of any experiments made with Mr. Horn's Machine, but of that invented by Mr. Cooke great uſe has been made in different parts of the Kingdom, with what ſucceſs will appear from the peruſal of the following letters; and as a full inveſtigation of the comparative advantages of the Drill and Broad-caſt Huſbandry, has long been a ſubject of attention, both by the public at large, and the Society, it is preſumed the following communications will tend to elucidate that matter.

The Society has been favoured with ſeveral other accounts of the advantages ariſing from the uſe of the Drill mentioned in the following papers; but the two annexed letters are judged ſufficient for the preſent publication, and thanks were returned to Mr. Malcolm, and Mr. Boote, for the judicious obſervations and accurate accounts of the experiments contained therein.

SIR,

Kennington Nurſery, Surry,
Dec. 22, 1786.

Dear Sir,

I Beg the favour of you to lay before our honourable Society, an experiment on a ſmall ſcale, of the comparative difference between the Broad-caſt and Drill Huſbandry, which I think deſerves to be made known.

The land on which the Oats were ſown had been dunged the year before, and a crop of garden Beans and Turneps produced thereon; about the end of February the ground was ploughed, and lay in furrows until the 24th of March 1786, on which day it was harrowed, and the ground ſown. I beg leave here to obſerve, that when the land was ploughed, and which is only two

Acres, I had no intention to try any experiment on it, or I would have divided the lands equally: It was plowed in three ridges or lands, agreeable to the incloſed plan. No 1, 2, 3. I made choice of No. 2. being the middle piece, for ſowing Broad-caſt; that no exception might be taken as to the quality of the land. I began with the Drill Machine on No. 1. which for want of practice, took up one hour and half; then No. 2. Broad-caſt, which we ſowed and harrowed in forty-five minutes: then No. 3, took up an hour and half; the whole crop came up very well, but the Drill appeared much the moſt regular, ſtronger, and of a more verdant colour.

On the 17th of May, I ſet two men to hoe the drilled crop, both experienced in hoeing every ſort of crops, the one with Mr. Cooke's Hoe, the other

ther with the common one. Cooke's hoed one fourth more ground in the ſame time than the common one; but the man ſaid, it was much harder work. I paid them at the rate of three-ſhillings per Acre, nor did I perceive any material difference in the performance, both being very clean and became the admiration of every paſſenger.

On the 27th and 28th of July, the whole was reaped, and in a few days was houſed without any rain; each parcel was thraſhed ſeperate, and the contents of each were agreeable to the plan.

If upwards of forty years experience in Agriculture, and an acquaintance with every Machine that has been tried before this honourable Society, I may be permitted to give an unbiaſſed opinion on this experiment, it would be greatly in favour of Drill Huſbandry, and particularly of Cooke's Machine, it being the only one I have ever ſeen that depoſits the grain of an equal depth, delivers evenly, and covers it properly; any grain thus treated has an indiſputable advantage over the Broad-caſt, even in land that is fine, but the difference muſt be very great in land whoſe ſurface is uneven and rough; in the one, the grain is very partially covered, and conſequently comes up at different times, and hence the crop is of an uneven height, and unequal as to ripening as well as to the ſize of the grain; on the contrary, thoſe that are drilled come up at the ſame time, keep equal pace, and all ripen together, are clean, free from weeds and graſs, and require much leſs time to dry the ſheaf, and the operation of thraſhing is of courſe much ſooner performed, beſides the opportunity it gives farmers to clean their ground that is either foul of weeds or graſs.

I alſo ſowed Garden Creſs and Muſtard, with the Machine, and although the ſmalleſt cups were much too large, and depoſited more ſeed than was neceſſary, yet the produce was nearly double I ever had from Broad-caſt. In the year 1785, I loſt the crop of eight Acres of Oats, and two Acres of Creſs and Muſtard, in Broad-caſt, which had they been drilled, I am ſatisfied would have produced a good crop.

If the foregoing obſervations ſhall tend in any degree to further the deſigns of the Society, with regard to Drill Huſbandry, and in particular relative to the Machine invented by that ingenious man Mr. Cooke, my end will be fully anſwered, and any other information the Society may require at any time, will with great pleaſure be communicated by Dear Sir,

Your moſt obedient Servant,

Mr. MORE.

Wm. Malcolm.

No 1. Drilled. contents 80 rods. ſowed 1 buſhel and half. produce 35 buſhels.
No 2. Broad-caſt. contents 80 rods. ſowed 2 buſhels and half. produce 31 buſhels.
No 3. Drilled. contents 1 acre. ſowed 2 buſhels and quarter. produce 74 buſhels.

Athurſton upon Stower, near Stratford upon Avon,
Warwickſhire. Decr. 9, 1786.

GENTLEMEN,

THE encouragement held out by your very laudable Society for the Encouraging of Arts, Manufactures, and Commerce, for various improvements, induces me to ſubmit to your candid conſideration, the following circumſtances in Agriculture.

For ſeveral years paſt, I have made uſe of the common ſingle Drill, for Beans, which has been productive of an uniform ſuperiority in a comparative view with Broad-caſt.

In the year of 1784, I was diſpoſed to make an experiment in drilling Wheat, when a ſervant of the Rev. Mr. Cooke, of Heaton-Norris, near Mancheſter, happened accidentally to paſs by on the road, by the ſide of my land, with one of the ſaid Mr. Cooke's new invented Drill Machines. I requeſted him to make an experiment, which he did upon a land, or ridge; the adjoining land of equal ſize, I had drilled with a ſingle Drill, and the remainder of the field ſown Broadcaſt. At harveſt, there was a decided ſuperiority in favour of the land drilled with Mr. Cooke's Machine. In particular it had this advantage over the ſingle Drill, that the ſeed was not buried, nor cruſhed in the delivery, the diſtribution more regular, and the depth more certain.

This Machine, at firſt ſight, appeared to be rather complex and difficult to uſe, but on its being ſet to work, and its conſtruction more maturely conſidered, I ſoon found it to be the very reverſe. The depth that ſeed ſhould be depoſited in the land, I have found by experience, to be of the utmoſt conſequence to all crops of corn; in this inſtance, the conſtruction of the Machine has ſingular merit; for whether it is at work upon a level, or upon riſing, or falling ground, or on a ſide ſlip, the depth that ſeed ſhould be depoſited, is readily fixed, even in ſoils of different textures, and that by common huſbandmen, of which I have had ample proof from my own ſervants. The delivery of the ſeed, and regularity of the diſtribution, are not leſs curious than they are ſimple, and certain. In the former inſtance, the ſeed is in no danger of being bruiſed or cruſhed; in the latter, the quantity per Acre, is buried at pleaſure.

In this light, the Machine appeared to me on firſt ſeeing it ſet to work, and that I was not wrong in my conceptions of it, my experiments upon a large ſcale, ſince that time, have exhibited undoubted teſtimony to all my neighbours, and ſeveral hundreds of gentlemen, and reſpectable farmers, who came from far to view my crops.

At Wheat ſeedneſs in 1785, having purchaſed a Machine, I drilled eighty acres with Wheat, the promiſing appearance of which, in the ſpring of 1786, encouraged me to drill all my Barley, being one hundred and twenty acres; alſo ſixty acres of Beans, twenty acres of Peas, twenty-eight acres of Oats, and ſixty acres of Turneps; in all, three hundred and ſixty eight acres: The reſult of the above experiments I have incloſed, having aſcertained them with the greateſt accuracy, by reaping and thraſhing ſeparately, the produce of one land or ridge of each crop, in a fair average part of each field, except the Oats and Turneps; the former were inadvertently omitted to be aſcertained; the latter were moſtly deſtroyed by the fly, as well as thoſe that were ſown broad-caſt.

During the ſowing of the above crops, an accurate account was taken of the quantity of ſeed that was expended; which being compared with the quantity that is commonly ſown broad-caſt, I found that I had ſaved upwards of one hundred and fifty pounds, in the article of ſeed, every ſhilling of which it was my intention to have laid out in hoeing the above crops, but the ſeaſon for hoeing was too ſhort to admit of it. Notwithſtanding which, by a ſtrenuous and active exertion, I had moſt of my drilled crops well hoed; an accurate eſtimate of which, I could not conveniently take, having at one and the ſame time, not leſs than one hundred men, women and children, employed in hoeing; but from the beſt calculation I can make, each hoeing will coſt upon an average, from one ſhilling and threepence, to one ſhilling and ſixpence per acre, with a Hoe invented by the ſaid Mr. Cooke; but ſuppoſing the expence of hoeing, and cleaning the land from weeds, to be ſomething more than I have ſtated, and ſuppoſing the advantages of drilling to be as great, or greater than any one would imagine, I am perfectly ſatisfied that the advantages of hoeing, are upon the whole, ſuperior to thoſe of drilling; having reaſon to believe from the cleanneſs of my land, that where I ſhall have one weed in my next crop, I ſhould have had thouſands from the ſeeds of the weeds of my laſt crop, if I had not cut them up in their infancy by the hoe; but to exhibit in a clear light, the full advantages of hoeing, I preſume, recourſe muſt be had to a number of experiments to be made upon the ſame land, for a number of years ſucceſſively. This, to be put in practice, by drilling and hoeing next year, the ſame land as was drilled and hoed this year, and by ſowing broad-caſt next year, the ſame land which was ſown broad-caſt this year; continuing the ſame practice for four, five, or ſix years ſucceſſively; at the expiration of which time, I have reaſon to believe, that the land which has been drilled and hoed as above, will produce a tolerable crop, and the land which has been ſown broad-caſt with common weeding only, will produce little elſe but a fleece of weeds. If the reſult of this experiment ſhall favour my expectations, I ſhall bid adieu to ſummer fallow, which indeed I have nearly done already, by carefully avoiding to take two exhauſting crops together, and as carefully ſtudying to take an exhauſting and an ameliorating crop alternately.

I have thus impartially repreſented to you the effects of the ſaid Mr Cooke's well conſtructed Drill Machine, on three hundred and ſixty-eight acres, which is more than I ever heard of being drilled by one perſon in one year.

And am,

Your moſt obedient humble ſervant,

JOHN BOOTE.

N. B. I have now growing one hundred and twenty acres of drilled Wheat, of a very promiſing appearance.

THE great and ſtriking Difference in the crops No 3, and 4. occaſioned the Committee of Agriculture, to whoſe conſideration the ſeveral accounts were referred, to order a Letter to be written to Mr Boote, requeſting him to inform the Committee, what he thought occaſioned the very great difference in the two experiments, No 3, and 4. as they ſeem to have been made on the ſame ſoil; and whether there are any other cauſes than the one having been ſown broad-caſt and the other drilled,

In anſwer to this enquiry, the following Letter was received from Mr Boote.

SIR,

NO. 3, and 4. is one field about thirty acres, part of a farm I have occupied from Michaelmas, 1783, and has from that time been cultivated and managed alike, taking an exhauſting and an ameliorating crop, alternately: The part ſown broad-caſt, with two buſhels and half of Seed to the Acre, which was the cuſtomary quantity, had a much better appearance than the drilled, until the firſt and ſecond hoeing had taken place in the Spring: another reaſon is, I think the broad-caſt, was over-burthened with ſeed, at an improper depth; the plants not having ſufficient room to thrive, which was apparently the reverſe with the drilled. I hope the above will prove ſatisfactory to the committee. I am Sir,

Your very humble Servant,

JOHN BOOTE.

Atherſtone upon Stower,
Jan. 26, 1787.

Account of the different Sorts of Grain, produced from Drill, on the Eſtate of Mr. JOHN BOOTE, of Atherſton of Warwick, in the Year 1786.

N° 1 Wheat growing upon a loamy ſand after Beans,
2 Wheat growing upon cold clay after Beans,
3 Wheat growing upon cold clay after Beans,
* 4 Wheat ſowed, broad-caſt in the ground after Bean
5 Peas growing on light ſand after Barley,
6 Barley growing on light ſand after Turneps,
7 Beans growing on loamy ſand after Barley,

The above Account was ſurveyed, and the Workmen

Stratford upon Avon,
Dec. 9, 1786.

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* Of an inferior C

duced from Seed ſown by the Rev. Mr. COOKE's Patent
of Atherſton, near Stratford upon Avon, in the County

	Land meaſured			Produced			Produce per Acre		
	A.	R.	P.	Buſh.	Gal.	Pts.	Buſh.	G.	Pts.
after Beans,	0	1	31	20	6	7	47	0	0
Beans,	0	1	29	19	2	1	44	5	4
Beans,	0	2	22	16	2	2	25	4	2
nd after Beans	0	2	4	5	0	1	9	4	4
ey,	0	1	23	19	6	2	50	2	1
urneps,	0	2	31	53	1	1	72	4	1
arley,	0	2	4	19	0	5	36	2	4

the Workmen examined by me, JOHN TOWNSEND.

* Of an inferior Quality.

ERRATA.

Page 11 line 1. for *next*, read *firſt*.
39. 6. for *if you Society will*, read *if your Society will*.
108. laſt line after *fair*, read *water*.
182. 2,3. for *proportinably*, read *proportionably*.
289. at the end, add 1789.
323. 16. for *horizonal*, read *horizontal*.
382. 10. before *Smith*, add *